

REMARKS

Section 112 Objection

The Examiner rejected claims 1-14 under 35 U.S.C. Section 112, first paragraph, stating that the claims contain subject matter which is not described in the specification. The objection relates to the word "inactive" to describe the buffer in claims 1 and 12. The word "inactive" was previously added to distinguish electrically active semiconductor layers in the cited references from the electrically inactive buffer layer of the present application. Applicants believe that adding "inactive" was unnecessary and have deleted the term. Claims 1 and 12 as amended now address this issue by including language that describes the location and function of the buffer (i.e. the buffer layer reduces lattice strain between the substrate and the group-III nitride compound layer by partial recrystallization of the amorphous/polycrystalline buffer layer when the group-III nitride layer is deposited at the higher temperature).

Section 102 Rejection

The Office Action rejects claim 12 under 35 U.S.C. 102(e) as anticipated by Ishikawa. Ishikawa discloses a technology to make a specific light emitting diode having a capacitor. Ishikawa uses a single InAlGa_N layer as a buffer layer and a multiple quantum well structure (a periodic structure with two different layers) as the active layer. Ishikawa does not teach or suggest a multilayer buffer that relieves lattice strain when the substrate, amorphous/polycrystalline multilayer buffer, and group-III nitride layer are heated to the higher temperature. The present application at pages 4-5 (see the first two paragraphs of "Detailed Description") explains how Applicants' structure differs from quantum wells, and provides improved crystalline quality for the group-III nitride layer compared to the structure obtained when only a single or double buffer layer is used.

Section 103 Rejections

a. Razeghi/Shakuda

The Office Action rejects claims 1-14 under 35 U.S.C. 103(a) as unpatentable over Razeghi in view of Shakuda. Razeghi and Shakuda do not teach or suggest a method or structure that uses an intermediate multilayer buffer formed of amorphous or polycrystalline semiconductor material at a relatively low temperature, which is then partially recrystallized during deposition/heating of a group-III nitride compound at a higher temperature and consequently produces a structure with reduced lattice strain between the substrate and group-III nitride layer and improved crystalline structure for the group-III nitride layer, as now claimed in independent claims 1 and 12 as amended. The multilayer buffer of the present invention (a) begins with a multilayer structure distinct from both Shakuda and Razeghi, (b) is transformed by recrystallization at a higher temperature in a manner not taught or suggested by Shakuda and Razeghi, thereby reducing lattice strain between the substrate and group-III nitride layer, and (c) results in an improved crystalline character of the overlying group-III nitride layer. These features are not taught or suggested by the references.

b. Schetzina/Shakuda

The Office Action rejects claims 1-14 under 35 U.S.C. 103(a) as unpatentable over Schetzina in view of Shakuda. Schetzina describes a single layer buffer and a quantum well structure. Schetzina does not teach or suggest an amorphous or polycrystalline multi-layer buffer for reducing lattice strain that is disposed between the substrate and a group-III nitride layer. As discussed above, Shakuda also does not teach or suggest the amorphous or polycrystalline multi-layered buffer for reducing lattice strain and improving the crystalline character of the overlying group-III layer, as now claimed in the present application. Therefore, Schetzina and Shakuda do not teach or suggest the present invention as now claimed.

CONCLUSION

Applicants have amended the claims to distinguish the present invention from the cited art, and have provided an explanation of why the buffers shown in the cited art do not teach or suggest the process and structure of the present invention. Applicants believe the amended claims are now in condition for allowance.

If any further questions should arise prior to a Notice of Allowance, the Examiner is respectfully invited to contact the attorney at the number set forth below.

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~~June~~ 6, 2004

Respectfully submitted,



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CERTIFICATE OF MAILING

I, Diana Dearing, certify that the enclosed papers are being deposited with the U. S. Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 on July 6, 2004.

